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Aug. 16, 2004  
Date

Inventor: Detore and Kyono )  
Serial No.: 10/035,513 ) Group Art Unit: 3682  
Filed: Oct. 19, 2001 ) Examiner: Vicky A. Johnson  
Title: "Hybrid Composite Flywheel Rim and Its Manufacturing Method"

## Reply Brief

August 16, 2004

Commissioner for Patents  
PO Box 1450  
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Sir:

This Reply Brief is being submitted in response to the Examiner's Answer dated June 16, 2004 in the above-identified Application.

This Reply Brief will address the arguments in the Examiner's Answer and will not repeat the sections of the Brief on Appeal sent March 25, 2004, except where necessary for updating or clarity.

### 4) Status of Amendments

On January 26, 2004 (concurrently with the Notice of Appeal), an amendment after final rejection was submitted under Rule 116. The amendment attempted to delete the "such as epoxy resin" phrase from claims 1 and 5 that the Examiner considers to be objectionable. The amendment also amended claim 1 to add "multiple layers" made of bands of tows. In an Advisory Action dated Feb. 23, 2004, the Examiner refused to enter this amendment because it "raised new issues requiring

further consideration and/or search” even though this subject matter is claimed in claim 7 and has been in claim 7 since the filing date.

On March 25, 2004, Applicants filed a Request for Reconsideration of the refusal to admit their R116 amendment, explaining that the added subject matter had already been claimed and searched. This Request was denied in an Advisory Action dated June 15, 2004.

On August 16, 2004, (concurrently herewith) Applicants filed another Amendment under Rule 116 to delete the “such as epoxy resin” phrase from claims 1 and 5, without the other amendments made in the R116 Amendment of Jan. 26, 2004, which were the only reasons given for refusing entry of the amendment.

## **8) Argument**

For simplicity of relating the summary Status of the Claims in §3 and the Statement of Issues in §6 with the related argument in this §8, the same letters used in §§3 and 6 will identify the argument sections.

A) Claims 1, 5 and 7 have been rejected under 35 USC 112, 2<sup>nd</sup> ¶, as indefinite because “the Examiner regards the phrase “a thermosetting resin such as epoxy resin” to be indefinite “because it is unclear whether the limitations following the [‘such as’] phrase are part of the claimed invention.”

Claim 1 calls for a hybrid composite flywheel rim having a cylindrical fiber-wound structure having at least two different types of fibers, including a first fiber type and a second fiber type, impregnated with a thermosetting resin such as epoxy resin, and wound in an annulus on a mandrel, said two different fibers having different elastic moduli; [underlining added to indicated the words in issue].

The heart of the §112 rejection of claims 1 and 5 (and claim 6, dependant on claim 5) is that “the phrase ‘such as’ renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention”.

The Examiner argues that “one having ordinary skill in the art could incorrectly interpret the language to mean that a thermosetting resin with properties similar to epoxy resin is required.” However, there is no basis in the specification for any such

interpretation. Indeed, the only mention of thermosetting resin is in the penultimate paragraph which states:

Wet filament winding, where a thermoset resin such as epoxy is impregnated into raw fibers during the winding operation, is the preferred fabrication method for a composite rim.

If there were any question about the interpretation of the “such as” example in claims 1 and 5, a person of ordinary skill in the art would look to the specification to see if there are any properties similar to epoxy resin that would be required. The specification does not teach that any particular properties are required in the thermosetting resin, so the Examiner’s concern about an incorrect interpretation would seem to be without foundation.

The Examiner’s argument could be applied to any limitation that includes a “such as” example, which would covert this technical rejection to an iron-clad per se rule against the use of “such as” in a claim, contrary to MPEP2173.02.

B. Claims 1, 5 and 7 have been rejected under 35 USC 102 as anticipated by Kimura et al (US 6,299,718). Claim 1 calls for a flywheel rim, including

a cylindrical fiber-wound structure having at least two different types of fibers, including a first fiber type and a second fiber type, impregnated with a thermosetting resin such as epoxy resin and wound in an annulus on a mandrel, the two different fibers having different elastic moduli;

said fiber is distributed in said cylindrical fiber-wound structure as bands of tows, each tow having only a single type of fiber, said tows lying in a lay-up pattern that is defined by the correlation between lead rate per mandrel revolution and winding length to produce a random distribution of said first fiber type amongst said second fiber type macroscopically.

The meaning of “random distribution of said first fiber type amongst said second fiber type macroscopically” is given in the specification in the penultimate paragraph as follows:

The fibers are arranged in tows and the macroscopic distribution of the carbon fiber tows is preferably uniform or random throughout the rim. The carbon fibers and glass fibers are concentrated in these tows, so the distribution of the actual fibers is not uniform or random, but the distribution of the tows is uniform or random. This is the meaning of "macroscopic" uniform or random distribution.

The Examiner argues that claim 1 is not limited to a flywheel rim despite the express language of the claim because it is interpreted as only "intended use", and that "none of the limitations pertain to a flywheel." Applicants do not understand why the PTO ignores the limitation in the preamble when it is Applicants' intent that the claim be limited to a flywheel rim, and the claim would be so limited in any court action.

Applicants do not agree with the Examiner that none of the limitations pertain to a flywheel rim. "A cylindrical fiber-wound structure wound in an annulus on a mandrel" certainly pertains to a flywheel rim.

Even if the Examiner ignores Applicants' expression in the preamble of what their invention is, Kimura does not meet the other limitations of claim 1. Kimura discloses a thick-walled cylindrical structural having alternating layers of carbon fiber and glass fiber at an approximate proportion of 9:1. The layers are put down as all glass or all carbon layers, with the carbon layers about 9 laminations thick over a single lamination of glass fiber. Thus, there is no issue of the undesirable stacking of like fiber types in a distribution of the two fiber types.

Kimura does not disclose a structure wherein the two fiber types are distributed randomly amongst each other, as claimed in claim 1. Indeed, in Kimura's structural member, the fiber types are each in discrete layers, not randomly distributed amongst each other as claimed. The Examiner interprets Kimura as disclosing a structure that meets this limitation, but Kimura does not teach carbon and glass fiber tows mixed in an evenly distributed way in each zone. Kimura's carbon and glass layers are all carbon or all glass in each layer, not mixed fiber types as claimed.

The Examiner argues that, while it may be true that the following limitation in claim 1:

said tows lying in a lay-up pattern that is defined by the correlation between lead rate per mandrel revolution and winding length to produce a random distribution of said first fiber type amongst said second fiber type macroscopically.

may be a structural definition of a lay-up pattern, as Applicants have asserted, "it is not a structural limitation of the rim". Applicants do not understand how it can be structural definition of a lay-up pattern, but not a structural limitation of the rim. Applicants assert that this limitation is a structural definition of a lay-up pattern of the rim. It is structure. It is unique structural arrangement by the distribution of fibers in the rim.

Claim 7 calls for a flywheel rim with an annular structure having a plurality of zones, each with multiple fiber types in a resin matrix. Each fiber layer has a mixture of carbon and glass fiber tows. The ratio of carbon to glass tows is constant in each layer of any single zone, and the ration increases incrementally zone by zone toward the outside zones of the rim.

Kimura discloses nothing of the sort. Kimura has multiple zones with each fiber layer being a single fiber type, not a mixture of fiber types. There is no mixture of fiber types in each layer, so the ratio per force could not increase radially toward the outside zones of the rim. The Examiner makes no effort to explain why this limitation does not distinguish over Kimura, although Applicants have an idea that the Examiner is misreading Kimura to disclose a mixture of fiber types in each layer because Figs. 3-5 might give that impression. However, it is clear that Kimura does not teach a mixture of fiber types in each layer, but teaches discrete layers of single fiber types in each layer.

Kimura does not recognize the problem that Applicants have identified and solved, in part because the fiber in each layer of Kimura's structure is a single fiber type. It is not a blended fiber structure, so there is no chance that like fiber types would become inadvertently stacked in undesirable ways. Like-fiber stacking is inevitable and not undesirable in single fiber layers, so Kimura would not ever have the problem faced by Applicants in overcoming like fiber stacking in a blended fiber structure. For these reasons, Applicants believe that Kimura does not anticipate

claims 1, 5, and 7, even if Examiner is correct to ignore major portions of the claims for patentability.

C. Claim 6 was rejected under 35 USC 103 as unpatentable over Kimura. The Examiner asserts that the winding of carbon fiber layers and glass fiber layers at different lamination angles, shown in Figs. 3-5 in Kimura, would produce a cross-hatching of fiber throughout a band. In fact, Kimura winds only one fiber type per band. He does not mix fiber types, hence there is no distribution of the fiber types amongst each other in the layers. They are discrete layers of a single fiber type in each layer. Kimura does not disclose anything that claim 6 could read on.

Claim 6 specifies the following relationship between the winding length and the lead rate:

$$W_L = (N + B/A) \cdot L_R$$

$$W_L + L_R < L_m$$

N : Maximum integer obtained when  $W_L$  is divided by  $L_R$

A : integer larger than B

B : integer smaller than A

$B/A \setminus 1, 1/2, 1/3, 1/4$

$W_L$  : Winding Length ( inch )

$L_R$  : Lead Rate ( inch )

$L_m$  : Distance between inner faces of two mandrel flanges (inch)

$$m \cdot L_R = n \cdot Sp$$

m : integer  $\geq 2$

n : integer  $\geq 2$

Sp : fiber space amongst other fiber ( inch )

The Examiner asserts that these limitations in claim 6 would have been obvious to a person of ordinary skill in the art because it would have been obvious to one of ordinary skill in the art to "optimize the strength of the flywheel". Also, the Examiner notes that the lamination angles of the carbon fibers and the glass fibers are not the same, and therefore the lead rate would change throughout the band.

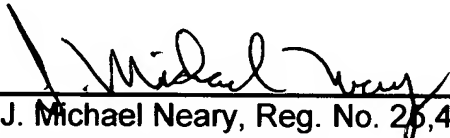
To be sure, the lead rate will change when winding at different lamination angles, as shown by Kimura, but that is not what Applicants are claiming in claim 6. Applicants are claiming the relationship of lead rate to winding length and Kimura

teaches nothing about this relationship. Moreover, Kimura teaches winding the different layers with single fiber types, so the problem solved by Applicants has no relevance to Kimura at all; the problem could never arise because there is no mixture of fiber types in any layer. Even if the relationship defined in claim 6 were obvious in the context of blended fiber winding, which Applicants emphatically deny, it would not be obvious in view of Kimura who teaches alternating layers of different lamination thickness in the different layers, and only a single fiber type in each layer

Thus, Applicant believes that the claims now pending in this application are patentable over the cited prior art and are allowable in their present form. Applicant respectfully requests that the Examiner's final rejection be reversed and that this application be remanded to the Examiner for allowance.

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